



# Lotus Coating

Mimicking Nature's Self-Cleaning Properties to Control Lunar Dust

## About the Technology

The lotus plant has inspired materials engineers and chemists to create a coating that mimics the plant's unusual self-cleaning/anti-contamination properties. Such a coating has the potential for widespread application, particularly with NASA's exploration program. A Goddard aerospace engineering team is now working with an Atlanta-based company, nGimat, to determine whether the company's currently developed "lotus coatings" can survive the harsh lunar environment and minimize moondust from accumulating on astronauts, their gear, and external spacecraft/habitation surfaces.

### Benefits of the Technology: At-A-Glance

- ◆ Offers a cost-effective and lightweight method for addressing the lunar dust problem.
- ◆ Requires low maintenance.
- ◆ Shows real promise as a viable dust-mitigation technology, as evidenced by environmental testing.

## Significance of the Technology

NASA has identified dust mitigation as one of its top priorities before sending humans back to the lunar surface for extended stays. Lotus coatings, which could be applied to spacecraft radiators, solar arrays, spacesuit material, visors, and any other type of lunar-exploration tool, is a very promising technology that could keep the highly tenacious dust from adhering to spacesuits and other critical spacecraft surfaces.

## How the Technology Works

The leaves and flowers on a lotus plant are composed of micron- and nano-scale structures that prevent dirt and water from adhering. Water droplets literally roll off, taking mud, tiny insects, and contaminants with them. The same principles apply to manufactured coatings. Made of silica, zinc oxide, other oxides, and mixtures of layers, these coatings create a nano-texture that simulates the lotus effect and reduces the surface area on which a contaminant can cling.

## Technology Origins

nGimat, the company that has produced two promising lotus-coating formulas, originally received military R&D funding to advance its technology. Goddard principal investigators now are using Internal Research and Development funding to determine their applicability in space.

## Looking Ahead

Environmental test results on nGimat's two formulations are promising. Both have maintained their particle-shedding properties even when exposed to harsh ultraviolet light and other space-like conditions. However, the formulas require additional development to optimize their potential use in space.

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